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Morphology of four species of charophyta from the reservoirs of Ajodhya hills and forest area of Baghmundi Block (Purulia District, West Bengal)

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Abstract

The present paper deals with morphology of 4-members of Charales (Green algae) such as *Chara fibrosa* var. *hydropitys* Reich. R.D.W., *Chara globularis* var. *virgata* f. *Leipicus* (Wheld.) R.D.W., *Chara zeylanica* var. *zeylanica* R.D.W. and *Nitella furcata* subsp. *flagellifera* f. *patula* (J.Gr. & G.O.A.). All species were collected from freshwater habitat of Ajodhya hills and forest area, Purulia.

Keywords: Chara, charales, freshwater, habitat

Introduction

Charophyta are green algae and have a worldwide distribution. Their plant body elaborated consists of long cylindrical, jointed green axis with a regular succession of nodes and internodes. Axis branched and each node of axis arises a whorl of lateral branchlets. Sexual reproduction complex oogamous visible with naked eyes. Lack of asexual reproduction. Five water bodies' namely Upper dam, Lower dam, Marble lake, Kestobazar lake, and Murguma dam which have been selected for the present study. The details of 5 water bodies are given below.

Sl. No.	Site	Latitude	Longitude	Altitude	*Area of water bodies	*Water depth
1.	Site- I (Upper Dam)	23.201709°N	86.095766°E	(494-516) mMSL	82900 square meters	22 Meters
2.	Site- II (Lower Dam)	23.193147°N	86.087350°E	(300-337) mMSL	1266000 square meters	37 Meters
3.	Site-III (Marble Lake)	23.212718°N	86.086895°E	465 mMSL	300 square meters	21 Meters
4.	Site-IV (Kesto bazar Lake)	23.186611°N	86.087334°E	350 mMSL	500 square meters	6 Meters
5.	Site- V (Murguma Dam)	23.315680°N	86.049350°E	(339.4-347.14) mMSL	Approx. 2000 square meters.	22 Meters

In India, the number of Charophyta described is poor and more extensive floristic study. The first monograph appeared in 1962, namely Charophyta by Pal, Kundu, Sundaralingam and Venkatraman. Some earlier reports were available on taxonomy of Charophytes by the investigations of Griffith (1849), Agarkar & Kundu (1937) ^[1], Kundu (1929, 1934-1935, 1937, 1941, 1959) ^[2], Chatterjee (1975, 1979) ^[2, 3], Pal & Santra (1987) ^[11], Mandal & Ray (2004) ^[9], Halder & Sinha (2016) ^[5] and Mondal, Pal and Keshri (2021) ^[8].

Materials and Methods

All the samples were collected from the five water bodies namely Site-I, Site-II, Site-III, Site-IV, and Site-V. The collected specimens were brought to laboratory and examined under a simple microscope (Model: GOKO, Magnification, 20X) with double convex lens magnifying glass with a short focal length, Levenhuk Biological Microscope (Magnification 40x to 1200x) and photographic analysis of objectives were performed with Microscope Digital Camera (Model No. SC MOS00350KPA, TOUPCAM) for morpho-taxonomical studies. Both fresh and preserved (4% formalin) samples were studied and micro

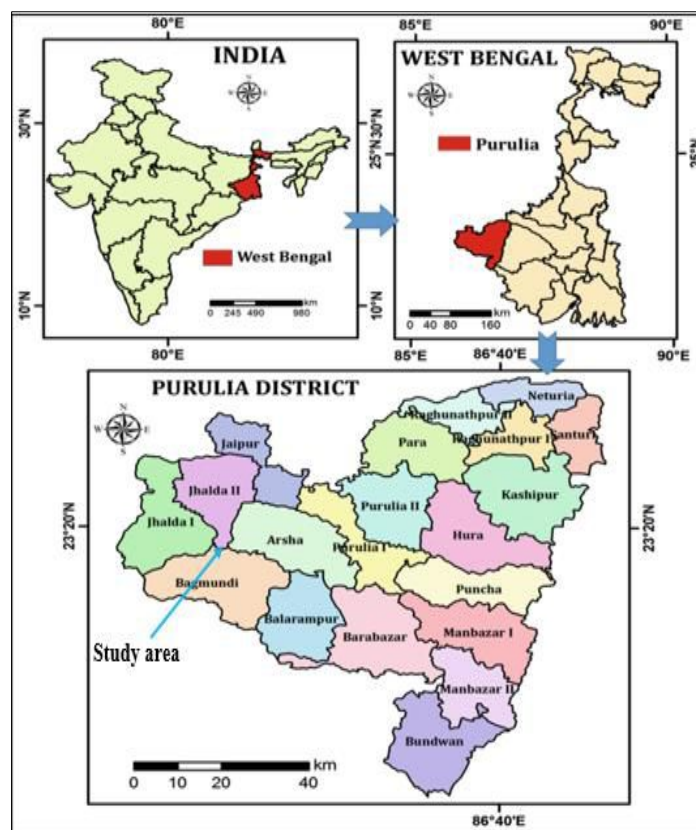
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measurement was taken and camera lucida drawings of observed specimens were made. Identifications of the taxa were done through authentic literatures and monographs

(Imahori 1954, Pal *et al.* 1962, Pal & Santra 1987, Subramanian 2002) [6, 10-12].

Study area map



Result and Discussion

In this study following four species belonging to Charophyta have been observed. These are enumerated below:

1. *Chara fibrosa* var. *hydropitys* Reich. R.D.W [12]

D. Subramanian; Monograph on Indian Charophyta. 90. 2002. (Plate-I, Fig. I & II)

Axis 340µm in thick, monoecious, stipulodes single series, axis 2-3 corticated, branchlet ecorticated 6-8. Segments 4-7, gametangia produced in the lowest 4-5 nodes, oogonia produce above the antheridia, oogonium 350µm long and 255 µm broad.

Date of collection: 04.09.2022

Place of collection: Site-I, V

Collection No.: P. D- 291

Magnification of microscopic observation: 40X

2. *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W. [12]

D. Subramanian; Monograph on Indian Charophyta. 101.2002. (Plate-I, Fig. III & IV).

Monoecious plant, slender axis upto 360 µm in diameter. Spine cells obscure, stipulodes haplostephanous, branchlet 8. Oogonium solitary 325 µm in diameter. Oospore golden brown. Antheridium 230 µm in diameter.

Date of collection: 04.09.2022

Place of collection: Site-I, III, V

Collection No.: P.D- 294

Magnification of microscopic observation: 40X

3. *Chara zeylanica* var. *zeylanica* R.D.W [12]

D. Subramanian; Monograph on Indian Charophyta. 93. 2002. (Plate. II, Figure. V-VIII)

Monoecious, dark stem with 710 µm thick. Branchlet ecorticated, branch let segments 9-11. Oogonium 750 µm in length and 550 µm in dia., oospore brownish black, antheridium orange with white jacket, quadriculate, 490 µm in diameter.

Date of collection: 04.09.2022

Place of collection: Site-I, III, IV

Collection No.: P. D- 295

Magnification of microscopic observation: 40X

4. *Nitella furcata* subsp. *flagellifera* f. *patula* (J.Gr. & G.O.A.) [12]

D. Subramanian; Monograph on Indian Charophyta. 41-42.2002. (Plate. III, Figure-ix-x)

Monoecious, 32 cm high, axes 515 µm in diameter. Branchlets 5-6 in a whorl, 3-4 furcate, terminal antheridium with 200 µm in diameter. Oogonium solitary, 455µm long and 380 µm wide. Oospore membrane seems to be reticulate.

Date of collection: 04.09.2022

Place of collection: Site-I, III, V

Collection No.: P. D- 296

Magnification of microscopic observation: 40X

Habitat supported the growth of these species due to proper limnological condition, undisturbed area and lack of anthropogenic activities. Till date only few charophytes

have been studied from this area. From the point of view of study showed that these Charophyta plants are rapidly mortifying.



Plate 1: Figure-i: *Chara fibrosa* var. *hydropitys* Reich. R.D.W. (Whole plant), Figure-ii. *Chara fibrosa* var. *hydropitys* Reich. R.D.W. (Reproductive parts), Figure-iii. *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W. (A portion of branch), Figure-iv. *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W. (Nucule)

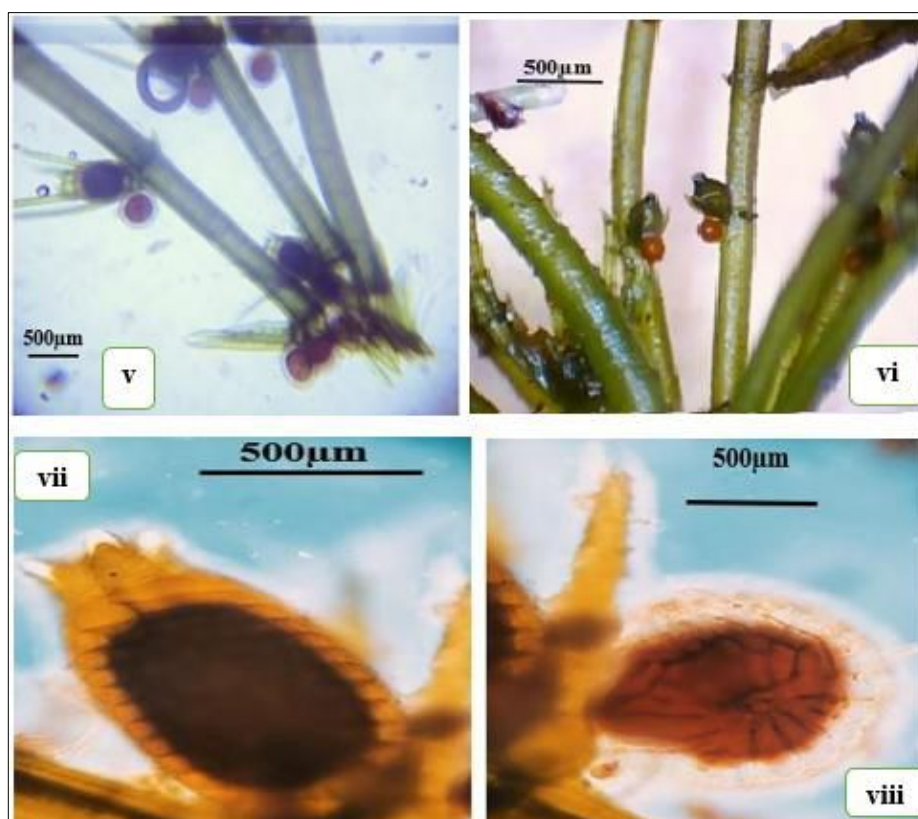


Plate 2: Figure-v & vi. *Chara zeylanica* var. *zeylanica* R.D.W (Plant with reproductive parts), Figure-vii. *Chara zeylanica* var. *zeylanica* R.D.W (Nucule), Figure-viii. *Chara zeylanica* var. *zeylanica* R.D.W. (Globule).

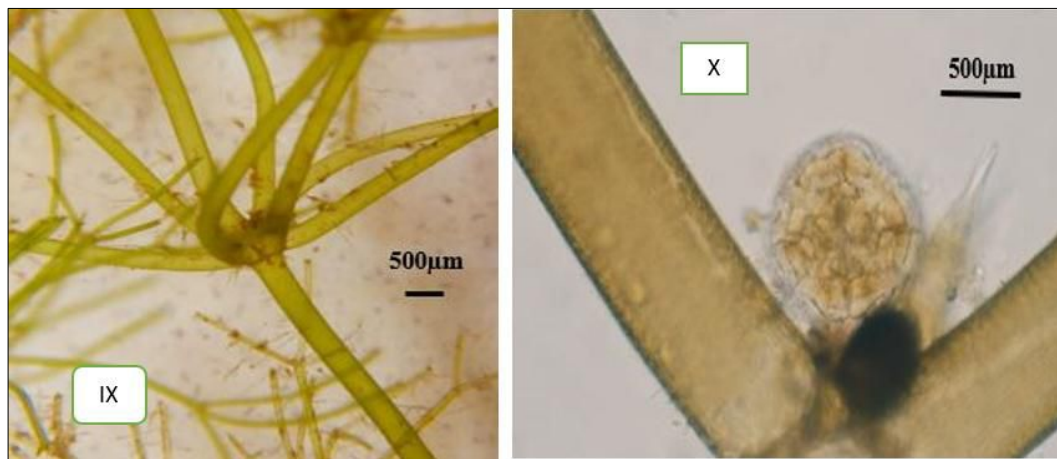


Plate 3: Figure-ix. *Nitella furcata* subsp. *flagellifera* f. *patula* (Plant body), Figure-x. *Nitella furcata* subsp. *flagellifera* f. *patula* (sex organ)

Camera - Lucida drawing

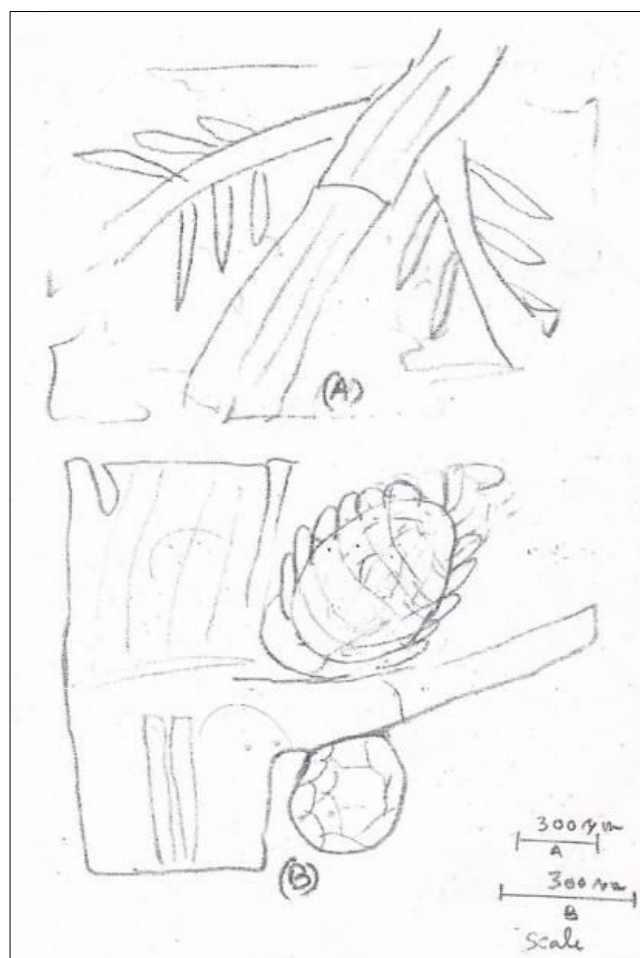


Fig 1: A: *Chara fibrosa* var. *hydropitys* Reich. R.D.W. (Whole plant), Figure-B. *Chara fibrosa* var. *hydropitys* Reich. R.D.W. (Reproductive parts)

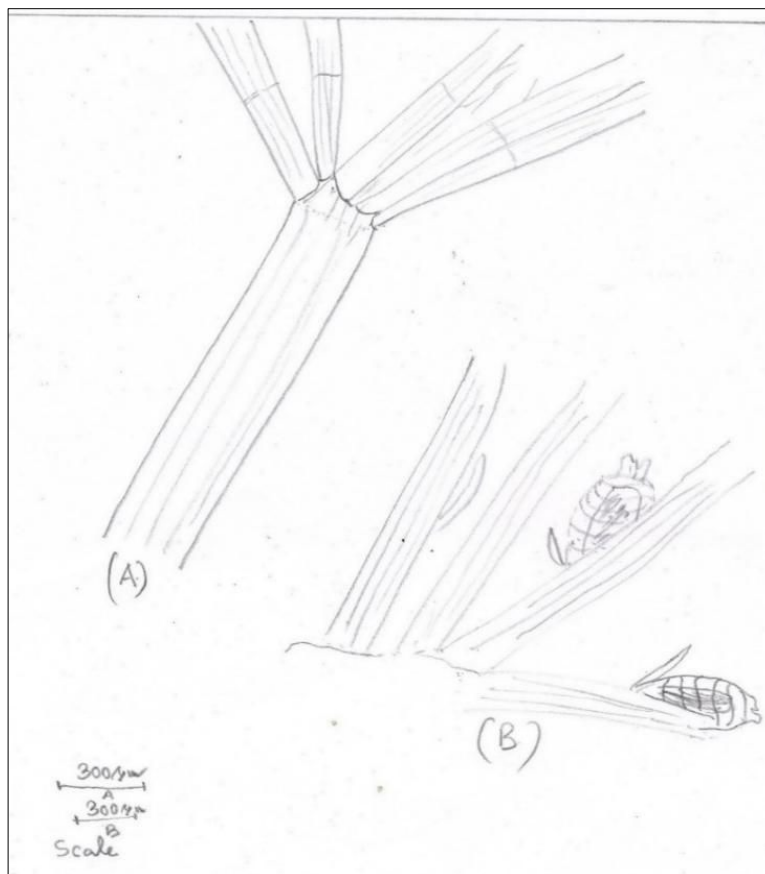


Fig 2: A. *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W. (A portion of branch), Figure-B. *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W. (Nucule)

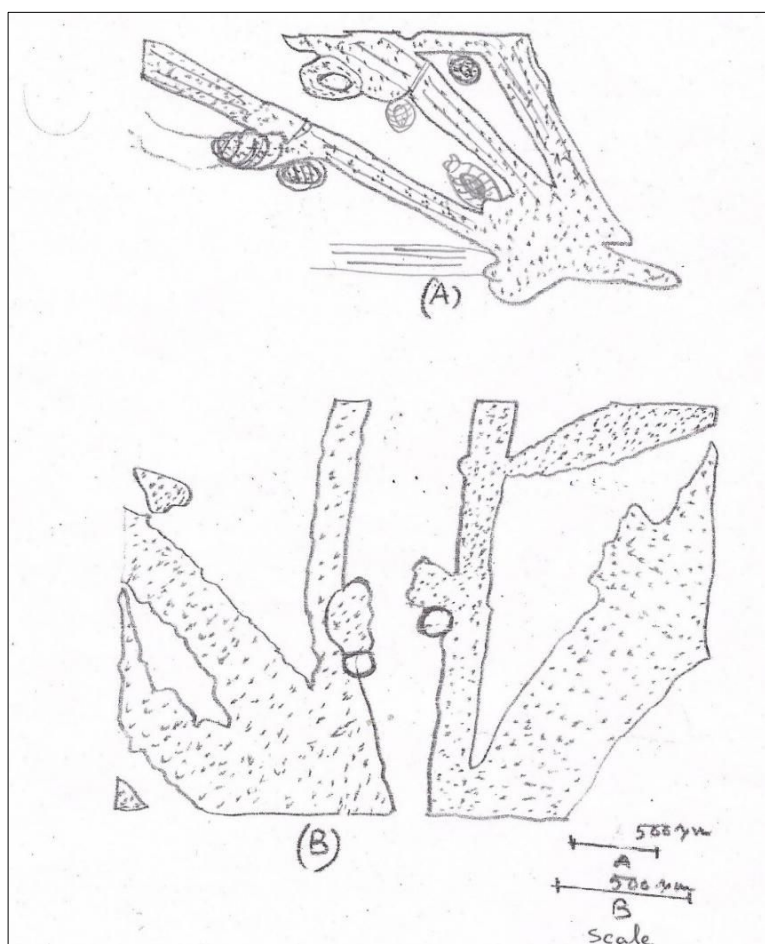


Fig 3: A & B. *Chara zeylanica* var. *zeylanica* R.D.W (Plant with reproductive parts)

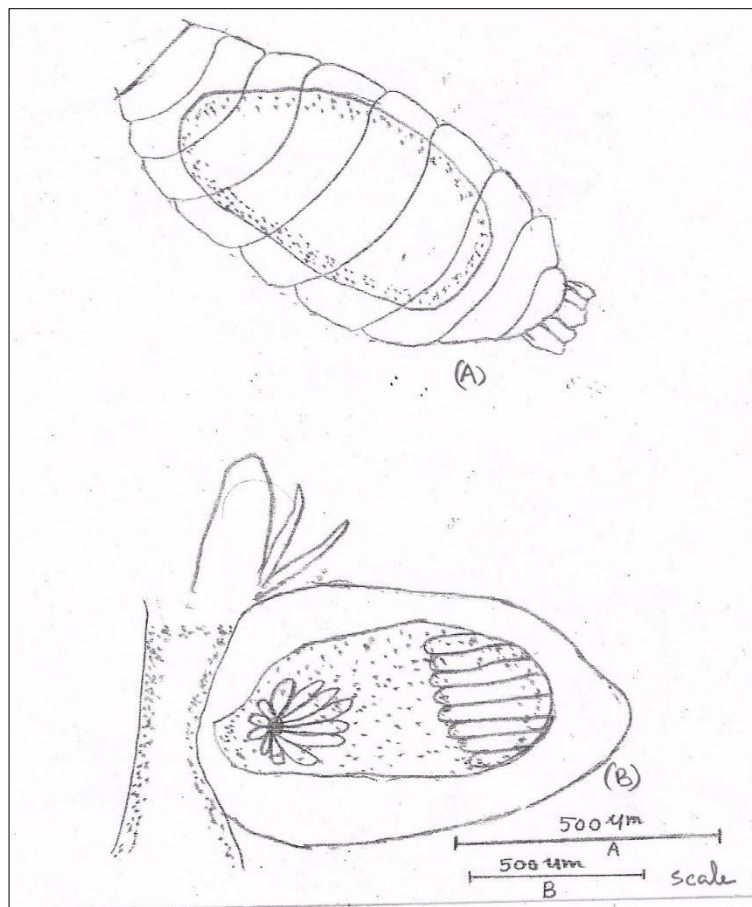


Fig 4: A. *Chara zeylanica* var. *zeylanica* R.D.W (Plant with nucule reproductive part), B. *Chara zeylanica* var. *zeylanica* R.D.W (Plant with globule reproductive part)

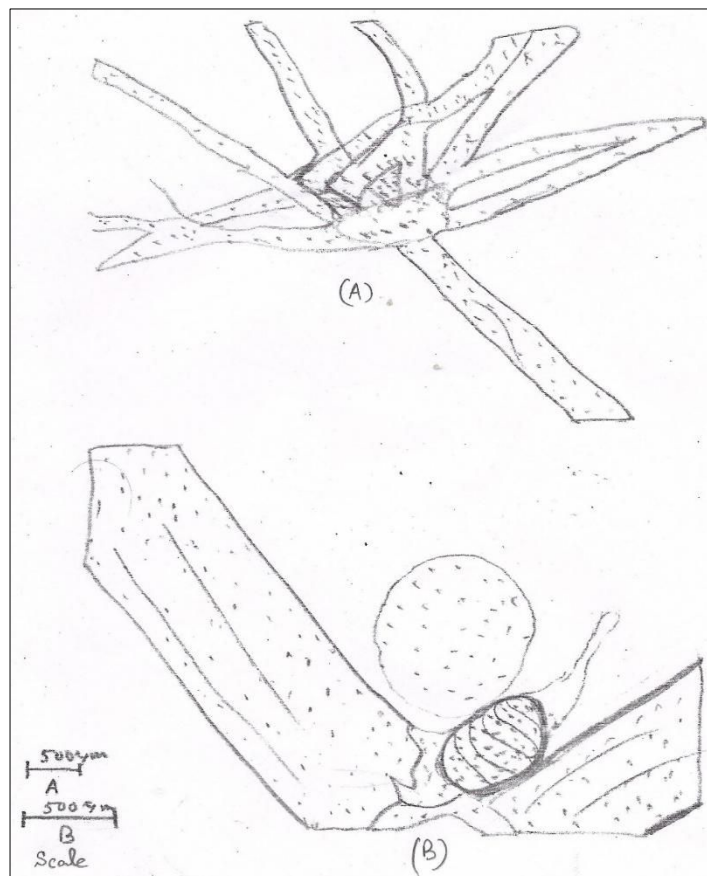


Fig 5: A. *Nitella furcata* subsp. *flagellifera* f. *patula* (Plant body), Figure-B. *Nitella furcata* subsp. *flagellifera* f. *patula* (Sex organ).

Conclusion

Chara fibrosa var. *hydropitys* Reich. R.D.W., *Chara globularis* var. *virgata* f. *Leiopicus* (Wheld.) R.D.W., *Chara zeylanica* var. *zeylanica* R.D.W. and *Nitella furcata* subsp. *flagellifera* f. *patula* (J.Gr. & G.O.A.) were identified by relevant literatures. All species were found in freshwater habitat. This study emphasized on the morphotaxonomy of collected Charophyta on the basis of morphology and reproductive features. Study of biodiversity provides an opportunity to know the algal form of natural habitat.

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Conflict of interests

No conflict of interest.

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